Status Report on the Wisconsin Closure Protocol
November 23, 2005

The final Scope of Work (SOW) for the State of Wisconsin Closure Protocol research study was completed May 25, 2004. The comments of four peer reviewers[1] were incorporated into the final SOW. To date, we have accomplished the following:

Task 1: Initial Screening of the GIS Registry for Closed Remediation Sites. Completed: January 2004. We defined the criteria for sorting all the closed sites in Wisconsin and created a database of sites closed between January 1999 and December 2000.

Task 2: Development of Study Database. The structure of the database, the information to be included in the database, and the format for extracting site data for inclusion in the database was completed in May 2004. On-going work involves reviewing and extracting data from individual site files to populate the database. Each file review and extraction takes 8 to 10 hours of work. Data from approximately 96 sites have been entered into the database as of November 2005. The database should be complete in March 2006 with data from approximately 130 sites.

Task 3: Database analysis. Initial database analysis, based on 97 sites, was performed in Spring 2005. Results of the database analysis can be found in an M.S. thesis titled, "An Assessment of Wisconsin's Natural Attenuation Closure Protocol", by Nathaniel R. Keller, and dated August 2005. The thesis can be found at: http://dnr.wi.gov/org/aw/rr/technical/index.htm. Approximately 34 additional sites will be reviewed and added to the database. Database analysis will continue throughout the rest of the study.

Task 4 & Task 5: Develop Field Studies, Sampling & Analysis Plan and Select Pilot Field Study Sites. The sampling and analysis protocol, health and safety plan, and selection of the pilot field study sites was completed between May and August 2004. The two field study sites met the criteria of being closed between 1999 and 2000 and were selected on the basis of the willingness of the owners to allow access and the installation of monitoring wells. Both were located in Dane County, WI. Access agreements with the State of WI Department of Transportation and the City of Madison were completed in July 2004.

Task 6: Pilot Field Study. The pilot field study took place between Aug. 4 and 17, 2004. Drilling was accomplished with geoprobe and solid stem auger techniques. One of our goals was to collect lithology samples at every borehole (10/site). However, the subsurface conditions proved too difficult for the ATV mounted geoprobe rig we used. The geoprobe couldn't advance through the large cobbles and dense till and sand we found at the study sites. We were able to obtain lithology samples from 1 – 2 boreholes at each of the study sites. We then used solid stem auger drilling to open the boreholes, take soil samples, log the soils, and install the 1" monitoring wells. Because we couldn't use the geoprobe rig, we were unable to obtain as many groundwater samples as we had intended. We compensated for this by installing short screened piezometers, both temporary and permanent to obtain groundwater samples from discrete intervals. We installed 10 – 10 foot screen water table wells at both sites, and 4 – 5 foot screened piezometers at one study site, and 3 – 1 foot temporary piezometers at the second study site.

[1] Peer reviewers were: John Wilson, U.S. EPA; Jim Weaver, U.S. EPA, Ryan DuPont, Utah State University; and Mark Malander, ExxonMobil.

We collected approximately 3 soil samples from the source area of both sites and preserved those with methanol. Groundwater samples were collected from all the water table wells, the piezometers, and a few discrete groundwater samples were collected using geoprobe techniques. All the samples were submitted to EPA's R.S. Kerr Research Laboratory on August 17, 2004.

Task 7: Full-scale Field Study. Eight field sites were identified in early 2005 for inclusion in the study. The sites were selected using the dates of closure as screening criteria. Of the 8 sites, all but one is publicly owned. Access agreements were signed by the responsible entities. Drilling work occurred between May and October, 2005.

A larger direct push drill rig was used in 2005. This allowed collection of the soil for lithology and groundwater profiling to identify contamination at depth. Groundwater profiling was performed at the sites where soil permeability allowed this type of groundwater sampling. Ten to 12 temporary wells were installed at each site and groundwater samples were collected for the suite of samples listed in the Scope of Work. Geochemical samples for natural attenuation were tested in the field and all laboratory samples were sent to EPA's lab in Ada, OK. Sulfate samples were sent to the University of Wisconsin Soils & Plant analysis laboratory. Data from this field work is still being processed.

Future Work

The second round of water quality samples and water elevation measurements from all 10 field sites (including he 2 pilot sites) are being collected in November and December 2005. A third round of samples will be collected in spring 2006. Database population should be complete in March 2006. A second M.S. thesis will be written to summarize and analyze all data from the second year of the Closure Protocol Study. That work should be complete by August 2006.

In summer 2006, the temporary monitoring wells will be abandoned at the 10 field study sites.

API Funded Additional Research

As an addition to the Closure Protocol study, the American Petroleum Institute (API) funded a three dimensional study of groundwater geochemistry at one of the field study sites. Marcia Schulmeister, Emporia State University, conducted the study which used a new geoprobe sampling device that doesn't interfere with groundwater geochemistry. Her results were recently presented at the meeting of the Geologic Society of America in Denver, CO. Her presentation is attached to this report.

API has approved a grant for research in 2006 to assess the 3-D groundwater geochemistry at another field study site. In addition, EPA researchers from Ada, OK plan to conduct a 3-D study of hydraulic conductivity at the same site. We will negotiate this additional work with the property owners in early 2006. This research is expected to take place in mid-May 2006.

Available Reports:

The following reports can be found at this link: http://dnr.wi.gov/org/aw/rr/technical/index.htm.

American Water Resources Association – Wisconsin Section, "Assessment of Wisconsin's Natural Attenuation Protocol", March 3 – 4, 2005.

Nate Keller, M.S. Thesis, "An Assessment of Wisconsin's Natural Attenuation Closure Protocol", August 2005.